

**DOE-NSF  
LHC Software and Computing Mini-Review  
July 8, 2004  
Germantown, MD**

The 2004 mid-year review of US-CMS and US-ATLAS Software and Computing projects took place on July 8<sup>th</sup> at DOE-Germantown. Present from the Agencies were Irwin Gaines, Saul Gonzalez, and Moishe Pripstein of DOE and Jim Whitmore of NSF. Attending part-time from DOE were Glen Crawford, Mike Procario, and Jim Reidy. Each experiment was given 3 hours for presentations and discussions. The collaborations were instructed to limit their presentations to a total of 100 minutes. Attending from CMS were: Robert Clare, Bob Cousins (by phone), Dan Green, Lothar Bauerdick, Ian Fisk and Sridhara Dasu. ATLAS attendees included: Howard Gordon, John Huth, Bruce Gibbard, Ian Hinchliffe, Jim Shank and Srini Rajagopalan. The review agenda is included in Attachment I.

A set of questions was compiled by the agencies and distributed to the collaborations prior to the review. The questions, which are reproduced in Attachment II, were divided into four categories: Management, Facilities and Grids, Software, and Physics Analysis Model. The collaborations were asked to prepare presentations focusing on the specific questions, while also giving a general overview of status and recent progress. They were also asked to include a response to the January review recommendations.

In general, both collaborations made excellent and well-prepared presentations. The presentations were generally responsive to the questions distributed before the review. Both US-ATLAS and US-CMS addressed directly the recommendations of the January Comprehensive Review. The consensus among the agency participants was that the mini-review was a very useful exercise.

Both experiments have a strong Research Program management structure in place, which is defined in the Program Management Plans. The funding split between Software and Computing and M&O is handled similarly in both collaborations; The Research Program Manager decides on the split and contingency for each program after consultations with the L2 managers. The collaborations presented different strategies to deal with the latest budget guidance and the prospect of budget uncertainties. US-CMS has delayed the start of some activities and proceeded with a “cautious” ramp-up in the Tier-1/Tier-2 facilities. This has resulted in an increased management reserve, allowing the start of Tier-2 work now. US-ATLAS gave a clear and concise presentation of their priorities under different budget scenarios. They have defined a prioritized set of tasks with resource estimates that are queued for action according to available funding. US-ATLAS is now equipped to respond quickly to questions of impact due to revisions in the funding guidelines.

Both experiments, as identified in the January review, continue to suffer from a manpower shortage in core software. US-ATLAS and US-CMS contribute their ‘fair share’ to the international effort; US-CMS commits to a software level-of-effort while ATLAS commits to specific software tasks. It is clear that some US milestones have slipped due to delays in milestones from the international collaboration. For example,

both experiments have experienced delays or reduced the scope in their recent data challenges due to immature core software. The agencies found it difficult to evaluate the effects of possible milestone delays on the overall project without a critical path analysis. Such analysis becomes more critical as the LHC start-up approaches. However, it appears that most major Software and Computing milestones will eventually be met for both collaborations. More vigilance is required in this area, in particular with non-U.S. milestones.

The collaborations are intensifying their efforts to integrate with LCG software and to exploit the Grid model. The agencies commend the collaborations for leveraging Grid3 resources and developments and incorporating multi-grids into their planning. The next major step in this direction will be incorporation of the Open Science Grid (with OSG-0) and the interoperability efforts with LCG. The Data Challenges and Combined Test Beam (in the ATLAS case) are providing important feedback, which will help refine the definition of the computing models and aid in the preparation for the computing TDRs. Both collaborations have defined the roles and responsibilities of the Tier-2 centers. University proposals to host a Tier-2 center will be evaluated in October 2004.

The collaborations have very different approaches and strategies regarding the Physics Analysis Centers (PAC). US-CMS is planning to center its physics activities at Fermilab, where US-CMS members will be hosted on short- or long-term visits. The FNAL PAC, which is located on the 11<sup>th</sup> floor of the hi-rise, will be used for software training, remote shift taking, and as a “nucleation center” for physics analyses. The US-ATLAS physics analysis model is based on full integration with the international collaboration, allowing the possibility of regional centers, not necessarily based solely at BNL, for analysis and training. US-ATLAS is establishing a formal “Analysis Support Group” (ASG) to provide training, technical support, and guidance to U.S. physicists. Organized by BNL, the ASG will not be a central physics coordination center, but a support group to facilitate entry into ATLAS physics. The agencies recognize that both models have great potential and are both under development. However, there are some dangers. There is a concern that the ATLAS effort could become too fragmented and not provide enough “critical mass” for an effective physics effort within the U.S. collaboration. The agencies also feel that, at the time of the review, the BNL Analysis Center concept was not sufficiently well defined. This area will be examined more closely at the next January review.

Both collaborations noted that communications with CERN are improving, but it is not yet clear that there is sufficient U.S. technical input to items such as grid computing. This is an area that needs continued monitoring.

The following action items were identified in the review:

- Both collaborations should perform critical-path analyses of their milestones
- ATLAS must develop more a concrete definition for the BNL analysis center
- CMS should develop a set of priorities based on different budgetary scenarios.

The next review of the US-LHC Software and Computing Program will be held on January 25-28, 2005 and will be hosted by ATLAS at the Brookhaven National Lab. The next review will also include a re-evaluation of the Software and Computing program needs beyond FY 2006.

**Attachment I – Review Agenda**

Introduction	<b>9:00</b>	S. Gonzalez (DOE)
<b>CMS</b>	<b>9:05</b>	
Management		LAT Bauerdick (FNAL)
Physics Analysis Center		D. Green (FNAL)
Software		R. Clare (UC-Riverside)
Facilities & Grids		I. Fisk (FNAL)
<b>Lunch</b>	<b>12:05</b>	
<b>ATLAS</b>	<b>13:00</b>	
Management		J. Shank (Boston U.)
Physics Analysis Model		I. Hinchliffe (LBNL)
Software		S. Rajagopalan (BNL)
Facilities & Grids		B. Gibbard (BNL)
<b>Closeout</b>	<b>17:00</b>	I. Gaines, S. Gonzalez, M. Pripstein, J. Whitmore

## **Attachment II – Questions to the Collaborations**

### **Management:**

- How have you adapted your planned activities and management reserve to accommodate the latest budget guidance for the next 3 years, including possible uncertainties?
- How will you determine the split between M&O and S&C?

### **Facilities and grids:**

- What are your current plans for Tier 2 selection and deployment? What is the selection process? Please list the criteria that will be used to assist in the selection process.
- How have the latest round of data challenges supported or contradicted the proposed LHC computing model?
- What is the status of plans for a multiple grid environment?
- What are current plans for long term support of grid middleware?

### **Software:**

- Have the manpower shortfalls in international core software efforts been eliminated, or are there still substantial remaining deficits?
- How are you tracking software progress: what is the status of specific software milestones for the last 12 and next 12 months

### **Physics Analysis Model:**

- What are your plans for a physics analysis center?
- Do your plans for a physics analysis center affect the role of (any) Tier-2 centers? If so, in what ways?
- What is the status of your physics analysis effort and plans for the future?
  - How does US-(ATLAS,CMS) compare to the rest of the collaboration in terms of physics preparedness?
  - How do you plan on tracking progress in this area? When/how do you validate the model?

Please respond to the January Computing Review recommendations.